Amendments to the Specification:

Please replace the title as follows:

~~MOUTH CYLINDRICAL PART OF SYNTHETIC RESIN BOTTLE~~

NECK OF A SYNTHETIC RESIN BOTTLE

Please replace the Abstract with the attached amended Abstract.

Please replace paragraph **[0001]** with the following rewritten paragraph:

[0001] This invention relates to a ~~mouth cylindrical part~~ neck of a synthetic resin bottle that is drawn and blow molded from a synthetic resin material, and in particular, to the structure of a ~~mouth cylindrical part~~ neck that has pressure tightness, heat resistance, and a high, stable sealing property and shows a resource saving advantage.

Please replace paragraph **[0002]** with the following rewritten paragraph:

[0002] The ~~mouth cylindrical part~~ neck of a bottle is given high heat resistance and rigidity by whitening the ~~mouth cylindrical part~~ neck in the thermal crystallization treatment. Such a ~~mouth cylindrical part~~ neck is used for the synthetic resin bottle to be filled with tea, fruit juice, liquid seasoning, retort-packed food and the like at a high temperature or to be subjected to an intermediate process, such as a thermal sterilization process, and is used especially for the biaxially drawn, blow-molded bottle made of a polyethylene terephthalate resin (hereinafter referred to as PET bottle). (See Patent Document 1.)

[Patent Document 1]: Application No. 1998-058527

Please replace paragraph **[0003]** with the following rewritten paragraph:

[0003] A multi-threaded screw structure is adopted to shortcut the rotating movement required to fit or remove the screw cap or to reduce the amount of synthetic resin material required to mold a ~~mouth cylindrical part~~ neck. The multi-threaded screw structure is utilized, especially for most of wide-mouth bottles, so that the ~~mouth cylindrical part~~ neck does not become too tall.

Please replace paragraph **[0004]** with the following rewritten paragraph:

[0004] In most cases, the cap screwed on the PET bottle is not an aluminum pilfer-proof cap that requires large screwing strength, but a synthetic resin pilfer-proof cap that does not require much strength. The ~~mouth cylindrical part~~ neck of a PET bottle can have the wall thickness and bead ring size that are smaller than those used in the case where the aluminum pilfer-proof cap is put on. Thus, the synthetic resin pilfer-proof cap gives a higher resource-saving effect.

Please replace paragraph **[0005]** with the following rewritten paragraph:

[0005] As shown in the rolled-out view of Fig. 11, the ~~mouth cylindrical part~~ neck in the conventional art is provided with a number of screw threads 30, which amount to three in Fig. 8, and these threads 30 are disposed at an equal central angle on the outer surface of round ~~mouth cylindrical part~~ neck wall 2. Each main thread 40 primarily carries out the screwing function of each screw thread 30. The anterior half of the main thread 40 of a screw thread 30 is located above the posterior half of a neighboring screw thread 30. In turn, the posterior half of the main thread 40 of the first screw thread 30 is located beneath the anterior half of the main thread 40 of still another screw thread 30.

Please replace paragraph **[0008]** with the following rewritten paragraph:

[0008] The screw engagement between the ~~mouth cylindrical part~~ neck and a screw cap is achieved in the main zones, which are equally spaced in the circumferential direction and in which the above-described screwing function is performed. On the other hand, the above-described auxiliary zones do not need to accept large screwing and fitting force. Therefore, the starting portion 50 and the ending portion 60 of these screw threads 30 are molded in sizes as small as possible within a range in which mold release and screw engagement can be achieved smoothly.

Please replace paragraph **0009** with the following rewritten paragraph:

[0009] The above-described conventional art had a problem in that there occurs contractile deformation, causing sinks (h) (See Fig. 11) in the top end face of the round ~~mouth cylindrical part~~ neck wall 2 and thus giving damage to the sealing property of the ~~mouth cylindrical part~~ neck. This contractile deformation was incurred by the thermal crystallization treatment conducted under conditions of decreased thickness of the round ~~mouth cylindrical part~~ neck wall 2, a large reduction in dimensions, especially height and width, of the bead ring 7, and a high temperature of about 180°C used to obtain heat resistance that makes the bottle usable as the container of retort-packed foods.

Please replace paragraph **[0011]** with the following rewritten paragraph:

[0011] It is believed that these sinks (h) have occurred because of decreased thickness of the round ~~mouth cylindrical part~~ neck wall 2 and a large reduction in dimensions, especially height and width, of the bead ring 7. Under these conditions, the flow of molten PET is affected by the thread-formed portions at the time when the ~~mouth cylindrical part~~ neck is injection molded, causing a difference in the degree of the molecular orientation. This difference has a large effect on the uniform thermal crystallization treatment of the entire ~~mouth cylindrical part~~ neck, and creates a large difference in the degree of crystallization among various portions of the ~~mouth cylindrical part~~ neck.

Please replace paragraph **[0012]** with the following rewritten paragraph:

[0012] This invention has been made to solve the above-described problem found in conventional art. The technical problem of this invention is to equalize the effect of thread-formed portions on the molecular orientation of the molten resin material as much as possible along the circumferential direction of the ~~mouth cylindrical part~~ neck. The object of this invention is to obtain a resource-saving ~~mouth cylindrical part~~ neck having high resistance to pressure and heat and high, stable sealing property.

Please replace paragraph **[0013]** with the following rewritten paragraph:

[0013] In the following description, the main thread zone is defined as a circumferentially extending zone of the ~~mouth cylindrical part~~ neck where at least two main threads are disposed, with one thread laid above the other. The thread extension zone is defined as a circumferentially extending zone of the ~~mouth cylindrical part~~ neck where at least one starting extension of a screw thread is disposed above the ending extension of another screw thread.

Please replace paragraph **[0014]** with the following rewritten paragraph:

[0014] The means of carrying out the invention of claim 1 to solve the above-described technical problem is a ~~mouth cylindrical part~~ neck of a synthetic resin bottle comprising a round ~~mouth cylindrical part~~ neck wall and multiple screw threads of a multi-threaded screw structure disposed on the outer surface of the round ~~mouth cylindrical part~~ neck wall, each screw thread comprising a main thread in charge of a screwing function, a starting extension extending from a main thread start point of the main thread with width and height thereof being reduced gradually from the dimensions of said main thread and an ending extension extending from a main thread end point of the main thread with width and height thereof being reduced gradually from the dimensions of said main thread , wherein the starting extension of a screw thread is vertically disposed above the ending extension of another thread, with both extensions in the same length, and wherein the ~~mouth cylindrical part~~ neck is entirely whitened by thermal crystallization.

Please replace paragraph **[0015]** with the following rewritten paragraph:

[0015] The sinks or dents caused by thermal crystallization in the top end face of the conventional ~~mouth cylindrical part~~ neck must have developed presumably in the following mechanism: An injection-molded preform in a test-tube shape is used for biaxial drawing and blow molding. In the injection molding operation, a molten resin is injected into the mold through the preform bottom position and is allowed to flow toward the top end face of the ~~mouth cylindrical part~~ neck. At that time, a large difference in the resin flow state grows in the circumferential direction of the ~~mouth cylindrical part~~neck, depending on the layout of screw threads on the outer surface of the round ~~mouth cylindrical part~~ neck wall, including the position of a starting portion or an ending portion of each screw thread, the number of screw thread rows that are in parallel, and the like.

Please replace paragraph **[0016]** with the following rewritten paragraph:

[0016] The temperature of the resin goes down in the vicinity of the top end face of the round ~~mouth cylindrical part~~ neck wall because the flow is coming close to an end in this portion. The differences in the pressure state and in the molecular orientation grow large under the effect of the flow state. Because the resin is in the final stage of flow, with subsequent clamping and cooling processes waiting, there is only a short period available for the molecular orientation to be absorbed. Therefore, in the molded product, there remains a difference in the state of molecular orientation that has occurred during the flow. This state of remaining molecular orientation is likely to cause a large difference in the degree of shrinkage in the thermal crystallization behavior.

Please replace paragraph **[0018]** with the following rewritten paragraph:

[0018] Due to the mutual complementation of vertical unevenness, the flow state of molten PET can be equalized in the circumferential direction of the ~~mouth cylindrical part~~ neck including the starting and ending extensions. As a result, the degree of oriented crystallization can be made uniform, and thus the sinks caused by thermal crystallization can be controlled effectively in the top end face of the ~~mouth cylindrical part~~ neck.

Please replace paragraph **[0021]** with the following rewritten paragraph:

[[0021] The invention of claim 3 includes the configuration of the invention of claim 1 or 2 and also comprises that the ~~mouth cylindrical part~~ neck has a multi-threaded spiral structure of screw threads in a number of n, with n being 2 or a larger integer, wherein main thread zones amounting to the number of n are formed in a central angle range of a little less than $360^{\circ}/n$, in which zones the main threads of at least two screw threads are disposed obliquely in parallel, with one main thread laid above the other, and wherein each thread extension zone is formed between two of said main thread zones that are equally spaced around the ~~mouth cylindrical part~~ neck, with the starting extension of at least one screw thread being disposed above the ending extension of another screw thread in these thread extension zones.

Please replace paragraph **[0023]** with the following rewritten paragraph:

[0023] The invention of claim 4 includes the configuration of the invention of claim 1, 2, or 3, and also comprises forming a groove in the outer surface of a round ~~mouth cylindrical part~~ neck wall in the circumferential direction at a height above the screw threads, at a specified central angle position, and in a specified central angle range to protect the ~~mouth cylindrical part~~ neck against sinks, which tend to develop in the top end face of the round ~~mouth cylindrical part~~ neck wall under the effect of thermal crystallization treatment, and then whitening the ~~mouth cylindrical part~~ neck by the thermal crystallization treatment.

Please replace paragraph **[0024]** with the following rewritten paragraph:

[0024] The configuration concerning the groove of claim 4 is added, if necessary, to the configuration concerning the positions of the starting extension and the ending extension of each screw thread according to claim 1 to 3, where the starting extension is vertically disposed above the ending extension. This groove configuration is aimed at effectively controlling the sinks caused by thermal crystallization in the top end face of the ~~mouth cylindrical part~~ neck.

Please replace paragraph **[0025]** with the following rewritten paragraph:

[0025] In the invention of claim 4, a peripheral groove or groove segments are formed in the upper portion of the outer ~~mouth cylindrical part~~ neck wall in the circumferential direction, at a height above the screw threads, at a specified central angle position, and in a specified central angle range while consideration is given to the layout of the screw threads. The entire flow of resin can be adjusted by narrowing the resin flow passage at the circumferential positions where the groove is formed. Because of this adjustment, it is possible to reduce the differences in the flow state in the circumferential direction and in the state of molecular orientation and to control effectively the occurrence of sinks that develop in the top end face of the ~~mouth cylindrical part~~ neck due to the thermal crystallization treatment.

Please replace paragraph **[0026]** with the following rewritten paragraph:

[0026] The groove formed in the round ~~mouth cylindrical part~~ neck wall can be effective even if it is about 1/10 as deep as the wall thickness. The groove serves to prevent the sinks from occurring, within the limit that no damage is given to the seal formed between a portion of outer surface right under the top end face of the round ~~mouth cylindrical part~~ neck wall and the upper portion of the inside wall of a screw cap. In addition, the groove can be made inconspicuous in its external appearance.

Please replace paragraph **[0029]** with the following rewritten paragraph:

[0029] The means of carrying out the invention of claim 5 comprises that the groove of claim 4 is formed around the ~~mouth cylindrical part~~ neck as intermittent groove segments.

Please replace paragraph **[0031]** with the following rewritten paragraph:

[0031] The invention of claim 6 includes the configuration of the invention of claim 3, and also comprises that the groove is formed as peripheral groove segments around the ~~mouth cylindrical part~~ neck in the outer ~~mouth cylindrical part~~ neck wall at the height above screw threads, except in the thread extension zones, to control the sinks caused by thermal crystallization in the top end face of the ~~mouth cylindrical part~~ neck.

Please replace paragraph **[0032]** with the following rewritten paragraph:

[0032] In the invention of claim 6, the groove is formed around the ~~mouth cylindrical part~~ neck, except in the thread extension zones where molten resin flow passages undergo a larger change than in the main thread zones. If the width of resin flow is narrowed in the area where the groove has been formed, then the effect of the change in the resin flow state of the thread extension zones can be adjusted at the time of injection molding of the preform. Thus, the sinks can be controlled effectively when the groove is combined with the configuration of the starting and ending extensions that are disposed vertically with one above the other.

Please replace paragraph **[0033]** with the following rewritten paragraph:

[0033] The invention of claim 7 includes the configuration of the invention of claim 1, 2, 3, 4, 5, or 6, and also comprises that a bead ring is disposed on the outer surface of the round ~~mouth cylindrical part~~ neck wall right under the threaded area and is used to fit a pilfer-proof cap made of a synthetic resin.

Please replace paragraph **[0034]** with the following rewritten paragraph:

[0034] In the invention of claim 7, a bead ring is formed so that a pilfer-proof cap made of a synthetic resin can be fitted to the ~~mouth cylindrical part~~ neck by means of this bead ring. In addition, the effect of screw threads on the molecular orientation can be softened to some extent by forming the bead ring.

Please replace paragraph **[0035]** with the following rewritten paragraph:

[0035] The invention of claim 8 includes the invention of claim 7, and also comprises that a bead ring and a neck ring are disposed in the lower portion of the ~~mouth cylindrical part~~ neck below the screw threads and that the ~~mouth cylindrical part~~ neck including these bead ring and neck ring is whitened by the thermal crystallization treatment.

Please replace paragraph **[0036]** with the following rewritten paragraph:

[0036] In the invention of claim 8, the bead ring and the neck ring are disposed, if necessary, in the lower portion of the ~~mouth cylindrical part~~ neck, and the ~~mouth cylindrical part~~ neck including these rings is whitened by thermal crystallization. Because of these bead ring and neck ring, relatively thick portions are formed peripherally in the lower portion of the ~~mouth cylindrical part~~ neck, and can be used to soften the effect of screw threads on the resin flow to some extent

Please replace paragraph **[0037]** with the following rewritten paragraph:

[0037] This invention having the above-described configuration has the following effects: Due to the mutual complementation of unevenness, the invention of claim 1 enables the flow state of molten PET to be equalized in the circumferential direction of the ~~mouth cylindrical part~~ neck including the starting and ending extensions. As a result, the degree of crystallization can be made uniform, and thus the sinks caused by thermal crystallization can be controlled effectively in the top end face of the ~~mouth cylindrical part~~ neck. The invention of claim 1 also enables the ~~mouth cylindrical part~~ neck to have a strong and stable sealing property.

Please replace paragraph **[0038]** with the following rewritten paragraph:

[0038] In the invention of claim 2, an improved extent of unevenness is obtained by the positional complementation between the starting extension and the ending extension, in which the former is disposed vertically above the latter. Since the extent of this complemented unevenness is almost equivalent to the extent of unevenness obtained from the main screw threads, the molecular orientation state can be uniformly distributed over the entire periphery of the ~~mouth cylindrical part~~ neck. Therefore, a sufficient preventive effect against sinks can be obtained from complemented unevenness.

Please replace paragraph **[0040]** with the following rewritten paragraph:

[0040] In the invention of claim 4, the resin flow state is adjusted by forming the groove in the circumferential direction at a specified position and in a central angle range. Coupled with the configuration concerning the positions of the starting and ending extensions of screw threads, with the starting extension being disposed above the ending extension, this adjustment serves to reduce the differences in both of the state of the flow in the circumferential direction and the molecular orientation state. Thus, the sinks caused by the thermal crystallization treatment can be prevented effectively from developing in the top end face of the ~~mouth cylindrical part~~ neck.

Please replace paragraph **[0043]** with the following rewritten paragraph:

[0043] In the invention of claim 7, the pilfer-proof cap made of a synthetic resin can be fitted to the ~~mouth cylindrical part~~ neck, and the effect of screw threads on the molecular orientation crystallization can be reduced to some extent. Therefore, the controlling effect against sinks can be further increased.

Please replace paragraph **[0045]** with the following rewritten paragraph:

[0045] Fig. 1 is a front elevational view of the bottle adopted in one embodiment of this invention.

Fig. 2 is a plan view of the embodiment shown in Fig. 1.

Fig. 3 is an enlarged vertical section of an important part of the embodiment shown in Fig. 1.

Fig. 4 is an enlarged plan view of an important part of the embodiment shown in Fig. 2.

Fig. 5 is an enlarged vertical section of an important part of the embodiment shown in Fig. 4, cut vertically at the position (e).

Fig. 6 is an explanatory plan view showing the relationship between main thread zones and thread extension zones of the ~~mouth cylindrical part~~ neck shown in Fig. 1.

Fig. 7 is an explanatory diagram of the ~~mouth cylindrical part~~ neck shown in Fig. 6, which has been rolled out.

Fig. 8 is a front elevational view of a bottle with the ~~mouth cylindrical part~~ neck adopted in the second embodiment of this invention

Fig. 9 is an explanatory plan view showing the positional relationship among the main thread zones, the thread extension zones, and the groove of the ~~mouth cylindrical part~~ neck shown in Fig. 8.

Fig. 10 is an explanatory diagram of the ~~mouth cylindrical part~~ neck shown in Fig. 9, which has been rolled out.

Fig. 11 is an explanatory diagram showing the rolled-out screw threads in a multi-threaded screw structure found in conventional art.

Please replace paragraph **[0046]** with the following rewritten paragraph:

[0046]

1 ; ~~mouth cylindrical part~~neck

2 ; Round ~~mouth cylindrical part~~ neck wall

3 ; Screw thread

4 ; Main thread

5 ; Starting extension

6 ; Ending extension

7 ; Bead ring

8 ; Neck ring

9 ; Body

10 ; Shoulder

11 ; Groove

12 ; Groove-missing portion

30 ; Screw thread

40 Main thread

50 ; Starting portion

60 ; Ending portion

a ; Main thread start point

b ; Main thread end point

c ; Position

d ; Position

e ; Position

f ; Main thread zone

g ; Thread extension zone

h ; Sink

Please replace paragraph **[0047]** with the following rewritten paragraph:

[0047] This invention is further described with respect to preferred embodiments, now referring to the drawings. Figs. 1-7 describe the ~~mouth cylindrical part~~ neck in the first embodiment of this invention. Fig. 1 is a front elevational view of an entire bottle having the ~~mouth cylindrical part~~ neck in the first embodiment of this invention. The bottle is a biaxially drawn, blow molded PET bottle, which comprises a body 9 having a bottomed cylindrical shape, a shoulder 10 having a truncated dodecagonal cone shape, which is disposed at the upper end of the body 9, and a ~~mouth cylindrical part~~ neck 1 according to this invention, which stands upright from the shoulder 10.

Please replace paragraph **[0048]** with the following rewritten paragraph:

[0048] The ~~mouth cylindrical part~~ neck 1 has multiple screw threads 3 (three threads in the embodiment shown in Fig. 1) of a continuous, multi-threaded screw structure disposed on the upper half of the outer surface of a round ~~mouth cylindrical part~~ neck wall 2. Right under this multi-threaded structure there is a bead ring 7 exclusively used together with a pilfer-proof cap made of a synthetic resin. This bead ring 7 is short in height and is not connected to the screw threads 3. A neck ring 8 serving as a support ring is disposed at the lower end of the outer surface of the round ~~mouth cylindrical part~~ neck wall 2.

Please replace paragraph **[0049]** with the following rewritten paragraph:

[0049] The ~~mouth cylindrical part~~ neck 1 including the neck ring 8 is entirely whitened by thermal crystallization (See Fig. 3). This thermal crystallization treatment is not limited to the ~~mouth cylindrical part~~ neck 1 only. As shown in Fig. 3 of this embodiment, thermal crystallization can also be applied to the upper end portion of ~~mouth cylindrical part~~ neck base, which denotes a portion connecting the ~~mouth cylindrical part~~ neck 1 to the shoulder 10. In some cases, roughly entire portion of the ~~mouth cylindrical part~~ neck base can be thermally crystallized to a low degree of crystallization.

Please replace paragraph **[0053]** with the following rewritten paragraph:

[0053] As shown in Figs. 6 and 7, under the spiral structure of screw threads 3 formed on the ~~mouth cylindrical part~~ neck 1, there are formed the main thread zones (f) in which a part of a main thread 4 is disposed above a part of a main thread of another screw thread 3 and the thread extension zones (g) in which a starting extension 5 of a screw thread 3 is disposed above an ending extension 6 of still another screw thread 3.

Please replace paragraph **[0059]** with the following rewritten paragraph:

[0059] Thus, the main thread zone (f) and the thread extension zone (g) are roughly equivalent to each other in the extent of vertical unevenness brought about by the screw threads 3. As a result, the two zones are also a good match in the degree of the molecular orientation of the PET material. Therefore, the sinks (h) can be prevented stably from developing in the top end face of the round ~~mouth cylindrical part~~ neck wall 2.

Please replace paragraph **[0061]** with the following rewritten paragraph:

[0061] The ~~mouth cylindrical part~~ neck 1 of the first embodiment shown in the drawings is 20 mm high and 38 mm in diameter, and is provided with three screw threads in the spiral structure although the multi-threaded screw structure is not specified to three screw threads. If the bottle needs to have a larger diameter than 38 mm, while keeping the height at 20 mm, then the number of screw threads can be adequately increased to more than three in response to the widened diameter.

Please replace paragraph **[0062]** with the following rewritten paragraph:

[0062] Figs. 8-10 show the ~~mouth cylindrical part~~ neck in the second embodiment of this invention. Fig. 8 is a front elevational view of an entire bottle with the ~~mouth cylindrical part~~ neck in the second embodiment of this invention. Fig. 9 is an explanatory plan view showing the positional relationship among the main thread zones (f), the thread extension zones (g), and the groove 11 of the ~~mouth cylindrical part~~ neck 1. Fig. 10 is an explanatory diagram shown in Fig. 9, which has been rolled out. The ~~mouth cylindrical part~~ neck 1 in the second embodiment has the same shape as the ~~mouth cylindrical part~~ neck in the first embodiment including the multi-threaded screw structure, except that the peripheral groove 11 is formed intermittently at positions right above the screw threads on the outer surface of the round ~~mouth cylindrical part~~ neck wall 2.

Please replace paragraph **[0063]** with the following rewritten paragraph:

[0063] Groove-missing portions 12 are disposed in three thread extension zones (g). Except in these groove-missing portions 12, the groove 11 is formed intermittently as groove segments (See Figs. 8 and 9). In this embodiment, the groove 11 is about 1/10 as deep as the thickness of the round ~~mouth cylindrical part~~ neck wall 2.

Please replace paragraph **0064** with the following rewritten paragraph:

[0064] The layout of the groove-missing portions 12 can be determined from experiments by observing the positions (See Fig. 11) of sinks that have occurred in the ~~mouth cylindrical part~~ neck 1 having no groove 11 and correlating the positions of sinks with the layout of screw threads 3, while giving consideration to the resin flow state.

Please replace paragraph **[0067]** with the following rewritten paragraph:

[0067] The resin flow exhibits complicated behavior in the vicinity of the top end face of the ~~mouth cylindrical part~~ neck during the time when preform is being injection molded. Although mechanism is not yet clear, the sinks occur frequently in the ~~mouth cylindrical part~~ neck, as shown in Fig. 11, at three points determined by a central angle position in the range of 20 to 40 degrees from respective main thread start points (a). However, it has been found that the behavior of resin flow or crystallization can be adjusted by the groove 11 at the end of the resin flow, even in the case of a groove 11 about 1/10 as deep as the thickness of the round ~~mouth cylindrical part wall~~ neck 2. As practiced in this embodiment, this can be done simply by correlating the positions of sinks with the layout of screw threads 3 and by changing the shape of the groove 11 accordingly.

Please replace paragraph **[0068]** with the following rewritten paragraph:

[0068] The groove can be utilized as a means of adjusting the resin flow state in various manner. Not only the position of the groove, but also the groove depth and width can also be changed as long as the groove does not give damage to the sealing property that should be established between the upper portion on the outer surface of the round ~~mouth cylindrical part~~ neck wall and the screw cap. In addition, plural peripheral grooves can be disposed around the ~~mouth cylindrical part~~ neck. If necessary, the groove configuration can be combined with the configuration concerning the positions of the starting extension and the ending extension of each screw thread, in which the starting extension is vertically disposed above the ending extension.

Please replace paragraph **[0069]** with the following rewritten paragraph:

[0069] As described above, the ~~mouth cylindrical part~~ neck of this invention effectively controls the sinks caused by the thermal crystallization treatment in the top end face of the ~~mouth cylindrical part~~ neck. The ~~mouth cylindrical part~~ neck of this invention is applicable to the retort-packed foods, which necessitate thermal crystallization treatment conducted at a high temperature of about 180°C, and is expected to have a wide range of uses.